

What is claimed is:

Wound dressing with gas

1. An apparatus for supplying one or more gases to a target area, comprising a top layer and a bottom layer sealed around the perimeter of the layers to form a reservoir between the layers, wherein the top layer has gas barrier properties and the bottom layer has high gas transfer properties, said reservoir containing one or more gases.
- 5 2. The apparatus of claim 1, wherein the apparatus further comprises an adhesive backing configured to affix the apparatus to the target area.
- 10 3. The apparatus of claim 1, wherein the top layer is comprised of a metallized polyester.
4. The apparatus of claim 1, wherein the top layer is comprised of a ceramic coated polyester.
5. The apparatus of claim 1, wherein the top layer is comprised of a polyvinylidene chloride laminate.
- 15 6. The apparatus of claim 5, wherein the polyvinylidene chloride laminate is Saranex®.
7. The apparatus of claim 1, wherein the top layer is comprised of an EVOH laminate.
- 20 8. The apparatus of claim 7, wherein the EVOH laminate is Oxyshield®.
9. The apparatus of claim 1, wherein the top layer is comprised of a polyamide laminate.
- 25 10. The apparatus of claim 9, wherein the polyamide laminate is Capran®.
11. The apparatus of claim 1, wherein the top layer is comprised of ethylene vinyl alcohol or ethylene vinyl alcohol/polyethylene.
12. The apparatus of claim 1, wherein the top layer conducts heat or electrical stimulation from an external source to the target area.
13. The apparatus of claim 1, wherein the bottom layer is comprised of polyurethane, silicone, polyvinylchloride, or polyolefins.
- 30 14. The apparatus of claim 1, wherein the bottom layer is porous or perforated

15. The apparatus of claim 14, wherein the bottom layer is porous or perforated in a manner sufficient to allow non-gas entities to pass through.
16. The apparatus of claim 15, wherein the non-gas entities comprise nutritional or therapeutic agents.
- 5 17. The apparatus of claim 1, wherein the gas contained in the reservoir is controllably released through the bottom layer to the target area.
18. The apparatus of claim 1, wherein an absorbent layer is attached to the bottom layer and said absorbent layer is between the bottom layer and the target area.
19. The apparatus of claim 1, wherein an absorbent layer is attached to the bottom 10 layer and said absorbent layer is between the top layer and the bottom layer.
20. The apparatus of claim 18 or 19, wherein the absorbent layer is ring-shaped.
21. The apparatus of claim 2, wherein the adhesive backing covers the perimeter of the bottom layer.
22. The apparatus of claim 2, wherein the adhesive backing covers the entire 15 apparatus.
23. The apparatus of claim 22, wherein the adhesive backing is integrated with the bottom layer.
24. The apparatus of claim 1, wherein a compliant porous insert is contained within the reservoir.
- 20 25. The apparatus of claim 23, wherein the compliant porous insert is comprised of a sponge-like material.
26. The apparatus of claim 24, wherein an absorbent layer is incorporated into the compliant porous insert.
27. The apparatus of claim 24, wherein the compliant porous insert fills the entire 25 reservoir and is adjacent to both the top layer and the bottom layer.
28. The apparatus of claim 18, wherein a compliant porous insert is incorporated in the absorbent layer.
29. The apparatus of claim 1, wherein the gas in the reservoir is oxygen.
30. The apparatus of claim 1, wherein the gas in the reservoir is nitrogen.
- 30 31. The apparatus of claim 1, wherein the gas in the reservoir is carbon dioxide.

32. The apparatus of claim 1, wherein said reservoir further contains a biologically beneficial agent.
33. The apparatus of claim 32, wherein the biologically beneficial agent is a drug, mineral, nutrient, amino acid, pH modifier, anti-microbial, growth factor or enzyme.
34. The apparatus of claim 33, wherein the biologically beneficial agent is contained in microcapsules incorporated in the adhesive backing.
35. The apparatus of claim 33, wherein the biologically beneficial agent is contained in a gel matrix in the reservoir.
36. The apparatus of claim 1, wherein the one or more gases are generated in the reservoir by a substance capable of producing one or more gases.
37. The apparatus of claim 36, wherein the substance in the reservoir is an oxygen-releasing agent.
38. The apparatus of claim 37, wherein the oxygen-releasing agent is an inorganic salt, a hydrogen peroxide containing formulation, intercalated magnesium peroxide, sodium percarbonate, sodium carbonate or hydrogen peroxide.
39. The apparatus of claim 36, wherein the substance in the reservoir is a nitrogen-releasing agent.
40. The apparatus of claim 36, wherein the substance in the reservoir is a carbon dioxide-releasing agent.
41. An apparatus for supplying one or more gases to a target area, comprising a top layer, an absorbent layer and a bottom layer sealed around the perimeter of the layers to form a reservoir between the top and bottom layers, wherein the top layer has gas barrier properties, the bottom layer has high gas transfer properties and the absorbent layer is attached to the bottom layer, said reservoir containing one or more gases.
42. An apparatus for supplying one or more gases to a target area, comprising a top layer, an absorbent layer, a bottom layer and a gel layer sealed around the perimeter of the layers to form a reservoir between the top and bottom layers and filled with the absorbent layer, said reservoir containing one or more gases, wherein

the top layer has gas barrier properties,
the absorbent layer is attached to the bottom layer and has high gas transfer properties,
the bottom layer has high gas transfer properties, and
5 the gel layer is attached to the bottom layer and contacts the target area.

43. An apparatus for supplying one or more gases to a target area, comprising a top layer having gas barrier properties and an adhesive layer, wherein the adhesive layer having gas barrier properties is attached to the perimeter of the top layer, such that the adhesive layer adheres to the surface around the target area, forming
10 a reservoir between the top layer and the target area such that the adhesive layer comprises the sides of the reservoir.

44. The apparatus of claim 43, wherein the top layer is convex when placed over the target area.

45. The apparatus of any of claims 1-44, further comprising a gasket that seals the top
15 and bottom layers together around the perimeter.

46. The apparatus of claim 45, wherein the gasket is a reinforced gasket that extends into the reservoir.

47. The apparatus of any of claims 1-46, further comprising a septum.

48. A packaging system comprising a substantially gas-impermeable enclosed
20 container containing an apparatus of any of claims 1-47 and one or more gases, wherein the desired ratio of the one or more gases is preserved in the apparatus reservoir.

49. A packaging system comprising a substantially gas-impermeable enclosed container containing an apparatus of any of claims 1-47 and a gas, wherein the
25 gas in the container is different from the gas in the apparatus and the two gases diffuse through the bottom layer of the apparatus to reach equilibrium within the enclosed container.

50. A method of delivering one or more gases to a target area comprising the step of applying to the target area the apparatus of any one of claims 1-47.

30 51. A method of charging an apparatus of claims 1-46 with one or more gases, comprising the steps of:

- a. placing the apparatus within a substantially gas-impermeable container, wherein the apparatus contains air within the reservoir;
- b. flushing the container with one or more gases sufficient to produce a desired ratio of gases; and
- 5 c. sealing the container and allowing said gases to permeate the reservoir of said apparatus via the bottom layer such that the one or more gases reach equilibrium in the apparatus and the container.

52. A method of charging an apparatus of claims 1-47 with one or more gases, comprising the steps of:

- 10 a. placing the apparatus within a substantially gas-impermeable container, wherein the apparatus contains one or more gases in a desired ratio within the reservoir;
- b. flushing the container with one or more gases in the same desired ratio; and
- c. sealing the container to maintain the desired ratio.

53. A method of charging an apparatus of claims 1-47 with one or more gases, comprising the steps of:

- a. placing the apparatus within a substantially gas-impermeable container wherein the container comprises a septum;
- 20 b. sealing the container;
- c. connecting a gas source to the septum;
- d. flushing the container with one or more gases sufficient to produce a desired ratio of gases; and
- e. allowing said gases to permeate the reservoir of said apparatus via the bottom layer such that the one or more gases reach equilibrium in the apparatus and the container.

25 54. A method of charging an apparatus of claims 1-47 with one or more gases, comprising the steps of:

- 30 a. placing the apparatus within a substantially gas-impermeable container, wherein both the apparatus and the container are in a controlled environment having the desired ratio of gases;

5 b. sealing the container in the controlled environment to capture the desired ratio of gases in the container; and

c. allowing said gases to permeate the reservoir of said apparatus via the bottom layer such that the desired ratio gases are contained in the apparatus.

55. A kit comprising any of the apparatus of claims 1-47 and instructional material which describes application of the apparatus to a target area to effect delivery of one or more gases to the target area.

56. A method of charging an apparatus of claims 1-47 with one or more gases, comprising the steps of:

10 a. placing the apparatus over the target area;

b. sealing the apparatus around the target area by applying pressure to the adhesive layer;

c. inserting a gas-introducing component connected to a source of one or 15 more gases in a desired ratio through the top layer into the reservoir;

d. introducing the one or more gases into the reservoir; and

e. removing the gas-introducing component from the apparatus.

57. An apparatus for wound healing, comprising a top layer and a bottom layer sealed around the perimeter of the layers to form a reservoir between the layers, wherein 20 the top layer has gas barrier properties and the bottom layer has high gas transfer properties, said reservoir containing one or more gases.